STRATEGIC PLAN

for

WILD TURKEY MANAGEMENT

State of California
The Resources Agency
Department of Fish and Game

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Strategic Plan
for
Wild Turkey Management

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1.0 INTRODUCTION

Wild turkey (*Meleagris gallopavo*) populations have grown to become an established part of much of California's mixed pine-oak woodlands resulting from numerous introductions dating back to the 19th century. Turkeys are highly popular animals for hunting and viewing, providing valued recreational and educational experiences to the public. Turkey populations have grown tremendously in recent years in certain parts of the state. Increasing desires by a segment of the public for more turkey recreational opportunities versus concerns about overpopulation of turkeys in some areas of the state have brought about new challenges to their management. This plan will seek to address those issues based and outline strategies for wild turkey management that balance the concerns and desires of the public.

1.1 Laws, Regulations, and Policies

State laws regarding fish and wildlife are enacted by the state legislature and listed in Fish and Game Code (FGC). Regulations are established by the Fish and Game Commission (Commission), and listed in Title 14 of the California Code of Regulations. The Commission consists of 5 members, who are appointed by the Governor for 6 year terms, and in addition to regulations, they are also responsible for general policy formation for the Department of Fish and Game (Department; FGC Section 703). The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (FGC Section 1802).

Fish and Game Code Section 1801 establishes state policies for the conservation of wildlife resources. The goal of these policies is to maintain sufficient populations of all wildlife and the habitat necessary to achieve the following objectives:

(a) To provide for the beneficial use and enjoyment of wildlife by all citizens of the state;
(b) To perpetuate all species of wildlife for their intrinsic and ecological values;
(c) To provide for aesthetic, educational, and nonappropriative uses;
(d) To maintain diversified recreational uses of wildlife, including the sport of hunting
(e) To provide for economic contributions to the citizens of the state, through the recognition that wildlife is a renewable resource, and;
(f) To alleviate economic losses or public health or safety problems caused by wildlife.

"It is the policy of the Fish and Game Commission to: Conserve, restore, maintain and enhance upland game habitat and to maintain upland game populations at optimum levels on public and private lands within California. The Department's upland game program shall be aggressively carried out in a manner that is consistent with Section 1801 of the Fish and Game Code and in accordance with the objectives and elements stated in each Upland Game Species Management Plan…"

"The Mission of the Department of Fish and Game is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public."

These laws, regulations, and policies of the state provide a framework of philosophies under which this plan has been developed. Turkeys are a valued resource for the people of the state. Although not native, turkeys provide aesthetic and educational experiences as highly visible animals that are part of the history the state. Turkeys appeal to a variety of people for their recreational value, including wildlife viewing and hunting, which provides significant economic contributions to the citizens of the state. Growing numbers of turkeys in certain parts of the state have brought about some economic losses, and public safety and health concerns. The Department will seek to manage turkey populations to resolve these conflicts while maximizing their value to the state.

1.2 Plan Purpose

The purpose of this plan is to: 1) identify current wild turkey management issues, 2) establish long-term management goals, and 3) outline strategies to achieve those goals. This is a strategic plan, which suggests management strategies based on the best information currently available. Turkey management is a learning process, commonly referred to as adaptive management in the management of natural resources (Holling 1978, Walters 1986). The Department has provided the following definition: "Adaptive Management means a flexible approach to the long-term management of fish, wildlife and habitat resources that is directed over time by the results of ongoing monitoring activities and other information. If the conservation goals and objectives of the program are not being achieved, the activities or strategies shall be refined and improved in order to achieve those goals and objectives." This document is intended to develop a vision for the direction of the Department's turkey management program, including goals and a range of strategies to meet those goals.

This plan does not outline specific projects, rather it provides a framework under which actions should be developed. The detail at which projects are designed and carried out preclude inclusion in this type of plan. Implementation of specific actions taken by the Department and/or other entities should be prioritized by needs, with clear objectives to meet the goals of this plan. Objectives should contain measurable parameters and monitoring programs to evaluate the success of those objectives. If objectives are not met, then management strategies are adapted or changed, thereby completing the adaptive management process.

2.0 BIOLOGY

2.1 Natural History and Distribution

The wild turkey belongs to the order Galliformes (ground-nesting fowl), family Phasianidae (pheasants and turkeys), subfamily Meleagridinae (Stangel et. al., 1992, Rea 1980, Steadman 1980). There are two species in the genus *Meleagris*, the wild turkey (*M. gallopavo*) and the ocellated turkey (*M. ocellata*). The wild turkey is native only to North America and occurs widely in the United States and northern Mexico (Tapley et al. 2001). The ocellated turkey occupies the Yucatan region of Mexico, Belize, and northern Guatemala (Stangel et al. 1992).

The wild turkey species (*M. gallopavo*) has been split into six recognized subspecies distinguished by geography, habitat, morphology, and plumage. The eastern subspecies (*M. g. silvestris*), is the most widespread and best studied subspecies. It ranges in deciduous forests primarily east of the Mississippi River, but it also extends to Missouri and the Dakotas (Lewis 1973). The smallest subspecies is the Florida turkey (*M. g. osceola*), which is found only in Florida. The Gould's turkey (*M. g. mexicana*) is the largest in size of the subspecies and is found predominantly in Mexico, but small populations exist in Arizona and New Mexico (Lewis 1973), with efforts currently underway to reintroduce extirpated populations in these areas (Wakeling et al. 2001). The Rio Grande turkey (*M. g. intermedia*) is a native of the arid region of the Rio Grande, ranging from southern Kansas through Texas to New Mexico and Mexico. This subspecies has also been introduced successfully throughout the western United States. The fifth existing subspecies is the Merriam's turkey (*M. g. merriami*), which is native to the semi-arid mid and southwestern United States, including South Dakota, Colorado, New Mexico and Arizona. This subspecies has also expanded its range throughout the western United States by introductions into central-northern Nebraska, western South Dakota, southwestern North Dakota, Wyoming, Montana, Idaho, Nevada, Washington, Oregon, and California (Lewis 1973). The Mexican turkey (*M. g. gallopavo*) is the sixth subspecies that once inhabited the region of southern Mexico. Domestic turkeys probably originated from this subspecies, which is now considered extinct (Pelham et al. 1992).

Besides geographic locations, turkey subspecies can be distinguished morphologically by comparative measurements of external characters and feather color patterns. Overall, the Gould's is the largest and the Florida is the smallest of the subspecies, with the Merriam's, eastern, and Rio Grande intermediate in size. The eastern and Florida subspecies have tail feather that are darker brown, whereas the western subspecies have whiter tips and rump feathers (Lewis 1973).

2.2 Life History

The wild turkey is a highly social flocking bird that maintains a hierarchy or pecking order. They form large flocks in the winter and disperse into sexually segregated flocks in spring and summer. Turkeys are polygamous and breeding behavior begins in

late winter as daylight increases. Toms or gobblers (males) call (gobble) and display for hens (females), who choose their mates. Turkeys are ground nesting birds. Hens become solitary as they begin nesting, laying about one egg per day until a clutch of about 10-12 eggs is laid. During laying hens generally spend less than one hour per day on the nest, foraging much of the rest of the time. They begin continuous incubation, which lasts 25-29 days when the entire clutch is laid. They often leave the nest for brief periods to feed during this time. Turkey poults (chicks) are hatched precocial (fully developed) and imprint immediately to the hen, from which they learn behaviors. Poults leave the nest with the hen within two days following hatching to forage and grow. By about 2 weeks of age, poults can fly and begin roosting in trees with the hen. They grow to adult size within 12-16 weeks and are sexually mature in their first year, although young hens do not always nest (Healy 1992).

2.3 Habitat Requirements

Throughout the wild turkey=s range, suitable habitat contains a combination of two key components: trees and open grasslands. Trees provide food, escape cover, and most important, nighttime roost sites, where turkeys can avoid predators and adverse weather conditions. Except for roosting, the wild turkey is largely a ground dwelling and feeding bird. Open grasslands are the other key component to suitable wild turkey habitats, providing food for adults, insect production for poults, and open areas where turkeys can efficiently forage while avoiding predation. Ultimately, moisture sufficient to produce suitable habitat conditions seems key in determining the range of wild turkeys, but moisture also limits turkey range. The wild turkey is not adapted well for marsh environments or persistent deep snow that exceeds 25 cm (10 inches; Porter 1992).

The ratio of forested and open grasslands varies throughout wild turkey range, from as little as 15% to as high as 90% forested habitat. However, the quality and interspersion of these habitats are probably most important. The annual home range of wild turkeys varies from 150 to 550 hectares (370 to 1,350 acres; Brown 1980) and contains a mixture of roosting habitat, nesting habitat, brood-rearing habitat, and fall and winter habitats. Turkeys often roost in the largest trees within a stand that provide easiest access (Rumble 1992), but also presumably to see their surrounding environment well. Physiographic characteristics of slope, aspect, and distance to water and clearings are also important for roost site selection (Porter 1992).

The characteristic most associated with nest site selection is lateral cover, which obscures detection by predators. Lateral cover is most commonly provided by shrubs, herbaceous vegetation and woody debris. An overhead canopy provided by shrubs and trees is also associated with successful nest sites. Proper conditions for nesting are best produced in woodlands. However, forest openings with herbaceous vegetation (grasses and forbs) are particularly important during brood rearing. These openings provide areas where poults can easily move around and frequently forage, while remaining concealed from predators. Nest sites that are in close proximity to good brood rearing habitats typically result in higher chick survival, further demonstrating the importance of well interspersed forested and open areas within suitable turkey habitat (Porter 1992).

The five subspecies of wild turkey occupy a range of habitat conditions, from eastern oak-hickory forest to mesquite-brush land of Texas, and they have also been successfully introduced to all of the western states and Hawaii, demonstrating the species ability to adapt well to different environments.

2.4 Foraging Ecology and Food Habits

Numerous studies have been conducted on wild turkey foraging ecology and food habits throughout their range, using crop and stomach contents and analysis of fecal material. Comprehensive reviews of wild turkey feeding ecology may be found in Hurst (1992), Korshgen (1967), and Schorger (1966).

Digestive System Physiology

Wild turkeys are omnivores that can consume a wide variety of plant and animal foods (Schorger 1966, Hurst 1992). Like other gallinaceous birds, wild turkeys have among the longest intestines and ceca of all birds, capable of extracting nutrition from numerous food sources, including coarse vegetation low in nutritional value (Schorger 1966, Blankenship 1992). Nutritional requirements of wild turkeys vary with age and by season, with a combination of acceptable foods needed to satisfy nutritional requirements (Beck and Beck 1955). Wild turkeys ingest food items through the esophagus and store them temporarily in their crop, which is an expandable organ reported to contain about 178 cubic centimeters on average when full (Schemnitz 1956, Mosby and Handley 1943). Food items then pass into the gizzard, which is a powerful organ that grinds foods for digestion, capable of crushing very hard items, including large seeds and fibrous vegetation that is usually well fragmented when excreted in fecal material. However, smaller hard seeds may sometimes pass through the digestive system intact (Schorger 1966, Blankenship 1992).

Diet

Wild turkeys are reported as opportunistic omnivores in the scientific literature (Hurst 1992). The crop and stomach contents of 524 wild turkeys in Virginia contained 354 different plant species (representing 80 families) and 313 different invertebrate species (Dalke et al. 1942, Mosby and Handley 1943). As part of their generalist feeding behavior, wild turkeys are consistently reported to forage from acceptable food items most available in their environment seasonally (Garver 1987, Hurst 1992). When examining any turkey food habits studies, the majority of the diet at any particular time is comprised of a few food items widely available in the environment at the time, accompanied by many incidental food items that are much less frequently consumed.

More recent literature, particularly addressing Merriam=s turkeys, has demonstrated that they are probably more selective foragers than has been assumed. When food items eaten by wild turkeys were compared with food item availability in the environment, Rumble and Anderson (1996) concluded that contrary to the reported literature Merriam=s turkeys were not opportunistic foragers, rather that they actually

exhibited high selectivity for certain types of foods given seasonal availability (Hoffman et al. 1993, Rumble and Anderson 1996). Hurst (1992) concluded that, AA review of the literature, makes apparent that, from Maine to Mexico, in a variety of different habitats, all turkeys eat a great variety of foods, but from the same general types: hard and soft mast, green forage, seeds, agricultural crops, and animal matter.@

Plants

In a review of wild turkey food habits, Schorger (1966) said that, AThe turkey consumes a great variety of animal and plant foods. By far, the greater part is from plants. Mast is consumed in the largest quantity when procurable, but some succulent plant material is essential. The food eaten depends largely on what is available.@ Plant materials consistently comprise the majority of the annual turkey diet throughout its range, with estimates as high as 95% of the total diet (Mosby and Handly 1943). Grasses and other green herbaceous plant leaves and seeds are the most utilized turkey foods throughout the year. Soft mast (fruits and berries) and hard mast (acorns and pine seeds) are important fall and winter foods. To a lesser extent, roots and tubors may also be utilized.

Animals

Invertebrates are the most reported animal foods consumed by wild turkeys. Insects are of particular importance to poults. Demands for protein are greatest during the first four weeks of life, and this demand continues through the juvenile stage to a lesser extent. During this time, insects also become widely available in the environment. Similar to plants, the most widely available invertebrates in the environment are generally consumed most. Vertebrates have rarely been reported in the literature, and mostly include amphibians and reptiles. As poults age, they shift food habits from animals to plants, which also reflects changes in availability of food items (Hurst and Stringer 1975, Healy 1985, Hurst 1992, Rumble and Anderson 1996).

Agricultural Crops

Wild turkeys often utilize agricultural crops when available, such as corn, wheat, oats, alfalfa, nuts, and fruits (Hurst 1992). Corn and grain crops in the Midwest have an important role in supporting turkey populations (Little 1980). Turkeys are often attracted to agricultural and orchard areas for a variety of reasons, including water and insects, and for the crops themselves.

Foraging Behavior

Wild turkeys feed almost exclusively from the ground or within the herbaceous vegetation layer. They do not usually feed in trees, except during periods of heavy snowfall when other food items are unavailable. Turkeys may wade into water to get both plant and animal matter. Feeding behavior generally involves a combination of scratching at the ground and pecking at food items. Scratching behavior is most common

when feeding for items on or beneath the surface of the ground, such as fallen mast and seeds or tubors, and is most prevalent during fall and winter. During spring and summer, turkeys tend to feed more in the herbaceous vegetation layer and will tend to pick or strip food items from vegetation (Hurst 1992). AFeeding movements are best described as nomadic within limits, seemingly aimless, yet purposeful in search for food@ (Korschgen 1967). Turkeys tend to feed in flocks and rarely remain still, moving at an estimated 3.2 km (2 miles) an hour as measured in some studies (Mosby and Handley 1943, Lewis 1973). Turkeys may feed any time of day, but generally have two periods where feeding is heaviest, in the morning after leaving the roost and in the late afternoon (Hurst 1992).

Hens with broods feed as a unit almost constantly. After poults reach one or two weeks of age, two or more successful hens often join together while feeding. Poults exhibit predatory feeding behavior early in life while feeding by pecking at food items that move away from them, mostly insects. They also exhibit behavior where they stalk, chase, jump, and tug at potential prey (Stringer 1977, Healy 1985). As they age, poults shift from exhibiting largely insectivorous to herbivorous behavior (Hurst 1992).

California Research

Wild turkey food habits were studied in San Luis Obispo County in 1966 (Smith and Browning 1967). The staple food item was wild oats through the year, supplemented by green grass and forb leafage in the spring and acorns in the fall. Wild turkey foraging ecology and food habits were studied in San Diego County during 1999 and 2000, which yielded similar results as the San Luis Obispo County study (California Department of Fish and Game unpublished data). This study is currently being drafted for publication.

3.0 POPULATIONS

3.1 Historical Perspective

Although turkeys were native to the southwestern United States, including Mexico, Arizona, and New Mexico, they were not found in California at the time of European settlement (Burger 1954a, Rea 1980). Prehistoric specimens of a closely related species now considered to be the California turkey (*M. californica*) have been found at Rancho LaBrea (Miller 1925) and other locations in southern California, including Los Angeles, Orange, and Santa Barbara counties (Steadman 1980). Numerous specimens at Rancho LaBrea suggest that this species was abundant in southern California during the late Pleistocene Epoch, but they went extinct about 10,000 to 12,000 years ago, presumably as the result of dramatic climatic change making the habitat no longer suitable. Specimens of *Meleagris* spp. from unknown origins and inseparable from either the California turkey or the modern wild turkey have also been found in a cave in Shasta County, with reports of specimens from a cave in El Dorado County (Steadman 1980). Currently, the prehistoric distribution of the California turkey is not considered to have extended into northern California (Rea 1980).

The first record of modern wild turkey introduction into California was in 1877, when birds from Mexico were released on Santa Cruz Island by private ranchers (Caton 1877). Records of releases by the Department begin in 1908, when 22 turkeys from Mexico were released in the San Bernardino Mountains (Schorger 1966). Later that year, 26 turkeys from the same region were retained by the Department as breeding stock (Harper and Smith 1975). Birds raised from that stock were also released in the lower Yosemite Valley, Sequoia National Park, and Tulare County (Schorger 1966). By 1913, the Department had continued developing breeding stock, primarily from Mexican turkeys, but also including 5 birds from Virginia, and reported additional releases in a number of locations from Humboldt and Shasta counties south to San Diego County, with some emphasis in the lower Sierra Nevada (Grinnell and Miller 1944). An outbreak of blackhead wiped out the breeding stock in 1913 and the program terminated (Schorger 1966). The population at Sequoia National Park grew in the initial years, but the last birds from those releases were seen around 1918 (Grinnell and Miller). About 1,240 turkeys were released throughout the state during those years (Harper and Smith 1973).

The Department continued to breeding turkeys in captivity, and in 1928, turkeys from Arizona were brought into the state for breeding and release (Grinnell 1928). The stock developed by the Department by that time was mostly from Mexican, Merriam's and domestic stock (Harper and Smith 1973). In 1928, the Department began aggressively releasing these game farm turkeys, later referred to as "California hybrids." Under this program, about 3,350 game farm turkeys were released in 23 counties throughout the state (Fig 3.1; taken from Burger 1954a). Only three populations were successfully established as a result of these stocking efforts, in San Luis Obispo, Sonoma, and Santa Clara counties (Burger 1954a, Burger 1954b, Slossen et al. 1970). Because of the poor success of game farm releases, the program was terminated in 1951.

The Department continued to experiment with releasing wild stock in 1949 and 1950, with Merriam=s turkeys translocated from Arizona to Tulare County. In just two years, 23 translocated birds had grown to an estimated population of about 200 birds (Fig. 3.2; taken from Burger 1954a). However, no known wild populations still exist from those releases. By the early 1950's, domestically propagated birds were considered inferior for establishment in the wild, because they did not have the learned characteristics required to survive and reproduce. With the invention of techniques that allowed for the capture of large numbers of wild birds, translocation of wild stock was preferred for establishing wild populations. In 1959, the Department released the first Rio Grande turkeys in California. Sixty-two birds from Texas released in San Diego County were successful in establishing wild populations (Burger 1954a, Graves 1975).

Following these initial successes, the Department continued releasing wild-trapped turkeys from other states to establish wild California populations. Rio Grande turkeys were the most popular subspecies because they were more available than Merriam=s stock and were highly successful in the seasonally-arid conditions of much of California=s oak woodlands. Rio Grande turkeys have become the dominant subspecies established in most of the lower elevation oak woodlands as the result of numerous releases statewide, and they are locally abundant in many areas of the state. Rio Grande turkey populations have probably replaced most of the game farm birds that had historically become established along the central coast. From 1959 to 1988, 2,924 turkeys were released under this program (Fig. 3.3).

More recent efforts to establish turkeys in higher elevation coniferous habitats have been attempted with Merriam=s turkeys. This subspecies is native to ponderosa pine (Pinus spp.) dominated habitats of the mid and southwest, including South Dakota, Colorado, and Arizona. Merriam=s turkeys are thought to have originated from turkeys domesticated by native American cultures, which became feral as these civilizations broke down (Rea 1980). Merriam=s turkeys have been released in the higher elevations of northern Coast Range, throughout northern California, the Sierra Nevada, and south to the San Bernardino Mountains, which have resulted in the establishment of local populations. Initially, releases of Merriam's turkeys did not appear to be as successful as Rio Grande turkeys, which may be attributable to numerous factors that are not clear, including habitat suitability, release methodology, and hunting pressure. However, more recent information suggests that these releases may be growing, particularly in northern California.

Eastern wild turkeys have also been released in Trinity County, but no pure strains of eastern turkeys are considered established in California. Naturally occurring eastern-Rio Grande hybrids from Kansas have also been released in the state along with Rio Grande turkeys, and these have resulted in the expansion of ranges in San Diego County and along the northern coast. Between 1989 and 1999, 943 turkeys were released with emphasis on higher elevation public lands (Fig. 3.4).

3.2 Current Range

Delineation of the range or distribution of an animal is not an exact science. An animal's range is continuously changing; populations go through contractions and expansions regularly for any number of reasons. Typically, biologists start mapping range by delineating locations that animals are known to inhabit, then gaps are then filled in by assuming that all suitable habitat between known occupied areas are also occupied. Mapping the range of an introduced species is even more complicated, because their populations are typically changing at a faster rate and habitat suitability is often not clearly understood.

Figure 3.5 presents a draft of the most recent attempt to depict wild turkey range in California. This draft map was created by a collaborative process between the Department and the USFS. Maps at a 1:100,000 scale were sent to local biologists in each agency statewide, including Wildlife Habitat Relationships (WHR; Mayer and Laudenslayer 1988) habitat types that are potentially suitable for wild turkeys and physiographic features. Turkey range is presented in two categories. The first category includes range where turkeys are thought to have established populations that are likely to remain over the long term, typically resulting from releases decades ago (prior to 1988), in habitats that are clearly suitable for turkeys based on previous population success. The second category represents range potentially occupied by turkeys, typically resulting from recent releases (since 1988), where the ultimate fate of these populations is uncertain and habitat suitability remains unclear (i.e. Merriam's turkeys in higher elevation habitats). All suitable habitat between gaps in known populations were assumed to be established as well in the first category; however, this assumption was not always applied to the second category.

This map is currently presented as the raw data and should be considered a work in progress. As with the rest of this document, comments on the draft map are welcome. The ultimate goal in the final plan will be to present a map that clearly represents the two previously described categories based on the best available information in 2003. This map will need to be revised periodically in years to come.

Wild turkeys are currently established in much of the lower elevation oak woodlands of the Sierra Nevada foothills and Coast Ranges, including the central coast, north coast through Mendocino County, south coast in San Diego County, and the foothills of the Klamath and Cascade mountain ranges of northern California. These turkeys are probably mostly of Rio Grande descent, but may contain genetics of "California hybrids" released by the Department up to 1951. Isolated populations of Rio Grande, Eastern, and Eastern-Rio Grande hybrid turkeys may also be found along the north coast in Humboldt and Trinity counties.

More recent efforts to establish wild turkey populations in higher elevation coniferous habitats with Merriam=s turkeys have occurred throughout the state in potentially suitable habitat, including northern California, the Sierra Nevada, and San Bernardino Mountains. These efforts have resulted in the establishment of local

populations in areas of the Tehachapi Mountains in Kern County, the San Bernardino National Forest, and isolated populations in northern California. The current extent of established Merriam=s populations in northern California is not clear, but they appear to be expanding. Isolated populations of Merriam=s turkeys are known to exist in Modoc, Siskiyou, Lassen, and Plumas counties.

3.3 Hunting

The first hunting season for wild turkeys in California was a two-day fall hunt in San Luis Obispo County in 1968. As turkey populations continued to grow, other counties were gradually opened to hunting, and by 1979 both spring and fall seasons were opened statewide, with the exception of San Diego County in the fall. Figure 3.6 presents wild turkey harvest trends between 1968 and 1991 from the Department's annual Game Take Hunter Survey, during which time harvest information was collected for both seasons combined. Tremendous growth occurred in wild turkey harvest during those years, presumably reflecting growth in both the turkey population and hunter numbers.

In recent years, the spring gobbler season has become more popular with hunters than the fall season. Of the two seasons, spring hunting is considered more biologically sustainable, allowing for harvest of up to 30% of the male population annually with no effects to population growth (Vanguilder 1992). However, studies in the Midwest have shown that harvest of more than 10% of the fall population will usually result in population declines, primarily because females are also harvested (Vanguilder and Kurzejeski 1995, Little et al. 1990). Some states have eliminated fall hunting entirely, in favor of the spring season. Regulations were changed in California in 1998, reducing the fall season from 30 to 16 days with a one bird season limit, and increasing the spring season limit from two to three bearded turkeys. The goal of this change was to shift the focus of the harvest from the fall season to the spring, primarily in an effort to protect populations on public lands. Figures 3.7 and 3.8 illustrate harvest trends since 1992, when the Department began collecting harvest information for the spring and fall seasons. Harvest leveled off in the early 1990's, with a decrease in fall harvest and increase in spring harvest following the regulation changes in 1998. Figure 3.9 presents average wild turkey harvest by county over the five most recent years of available harvest survey data. These data illustrate those areas of the state where the turkey population and hunting pressure are highest.

Currently, the spring season is open statewide for bearded turkeys, with a one bird per day, 3 per season limit, starting the last Saturday in March and extending for 37 days. The fall season is open in all counties except San Diego, with a one either-sex bird per season limit, starting the second Saturday in November and extending for 16 consecutive days.

4.0. GOALS, STRATEGIES, AND RECOMMENDATIONS

The following chapter presents management goals, strategies, and recommendations in four sections: 1) controversial issues, 2) educational and recreational opportunities, 3) population monitoring and harvest management, and 4) conservation partnerships. Because many of these topics share common themes, they are presented in an order that introduces issues that are built upon in subsequent sections, not necessarily reflecting the relative importance of management priorities. For example, controversial issues are presented initially, so that they may be considered throughout the plan. The goals, strategies, and recommendations in this plan consider numerous factors, including the laws, regulations, policies, and management goals of other agencies and private entities. Topics are presented as major issues, which establish the need for specific management strategies that the Department will undertake and/or recommendations by the Department for actions by other entities.

4.1. Controversial Issues

4.1.1: Conflicts between turkeys and people in residential settings

A variety of complaints are received by the Department regarding turkeys causing a nuisance in residential areas, including damage to gardens and landscaping, excessive defecation on walkways, and relatively minor damage to building structures. These types of problems have grown from almost nonexistent to common in the past five years, primarily in the area east and north of San Francisco Bay and the Sierra Nevada foothills. Turkeys that live in residential areas learn to have no reason to fear people and over time they will often interact closely with people. These problems are often caused and/or exacerbated by people feeding turkeys.

Occasional issues of public safety have been reported when turkeys are behaving aggressively towards people. Turkeys being fed by people may approach people aggressively, competing with one another for food. Turkeys may appear to behave aggressively, but they generally pose little threat to public safety. Turkeys have also been reported as the cause of traffic accidents in various parts of the state. Although turkeys are not considered a high public safety threat, turkeys should be managed to minimize their interactions with people.

Goal: Minimize unwanted interactions between turkeys and the public

Strategies:

a. Provide public service to prevent nuisance-related problems

The Department will assist the public is resolving conflicts with wild turkeys that are causing a nuisance. The Department will provide advise to the public to prevent or minimize nuisance related problems for routine complaints, and it will investigate those that are chronic and/or potentially more severe. Turkeys that are considered a direct

threat to public safety may be destroyed at the discretion of the Department or any law enforcement agency. Through this process, the Department will seek to better understand the types of nuisances turkeys are causing, potential public safety and health risks, and efficacy of preventative measures recommended to the public.

b. Discourage feeding of turkeys.

Nuisances are often caused by people feeding turkeys, and most people are not aware that feeding is not acting in the best interest of the birds. Feeding actually puts turkeys in jeopardy by altering their wild behavior and preventing young birds from learning some of the skills they need to survive in the wild. Turkeys are generally not limited by food in California and they don't need to be fed to survive. To date, the Department has tried to discourage feeding of turkeys in these situations. However, in some cases people have refused to cease feeding turkeys when asked.

The Department will recommend that the Commission consider a regulation prohibiting the feeding of wild turkeys, similar to existing regulations prohibiting the feeding of big game (CCR, Title 14, Section 251.3).

c. Discourage the release of domestic stock by private citizens

Although illegal (CCR, Title 14, Section 671.6), private citizens occasionally release turkeys on their own in hopes of establishing wild populations. Domestic birds are imprinted to humans, therefore they may seek out people for food and shelter, potentially becoming a nuisance problem. Most domestic birds will not survive to become established, but they may interbreed with wild birds, which reduces the quality of the gene pool. The Department does not know this issue to be a widespread problem, but it will seek to prevent more widespread concerns by enforcing the previously stated regulation when possible.

d. Relocate chronic problem turkeys.

In cases where turkeys are causing a serious and/or chronic nuisance and reasonable attempts have been taken to prevent and/or alleviate the problem by the landowner, the Department will consider trapping and relocation at its discretion. Hunting should also be considered prior to any decision by the Department to relocate nuisance birds, recognizing that unless located in a rural area, it may not be an option. Nuisance turkey populations are also a growing concern in other states, and trapping and relocation is the preferred method used by a number of states for addressing the issue, when hazing attempts are not successful. Limited experience by the Department has shown that relocated turkeys generally remain within the release area and no subsequent nuisance complaints have been received regarding relocated turkeys. However, the Department has concerns regarding the efficacy in resolving the problem over the long term versus cost of relocation programs and potential effects of releasing nuisance turkeys in other areas. Generally, the Department does not support the relocation of nuisance animals such as bears and mountain lions because these animals often acquire

behavioral traits that remain with them after relocation, potentially affecting public safety. Experience with turkeys suggests that their behavior can be reversed when turkeys are released in appropriate locations.

The Department will conduct turkey relocations on an experimental basis at this time as a better alternative to lethal removal. Turkeys will only be removed from areas where they are a chronic and/or serious problem and when most of the community is in support of such actions, or in situations of public safety or health. Turkeys will be released in areas where turkey populations are already established and where public hunting is allowed, such as Department Wildlife Areas. The intent of these translocations is to relocate nuisance turkeys, not to expand range. Post-release monitoring will be conducted in both the removal and release areas to determine the effectiveness of relocation in resolving the most serious problems and to help guide future management objectives (also see Population Monitoring).

4.1.2: Agricultural depredations by turkeys

Complaints of agricultural depredations by turkeys have increased in recent years, particularly to wine grapes. In 2000 and 2001, the Department and the National Wild Turkey Federation (NWTF) investigated 28 vineyards who reported damage by turkeys. Remote cameras were also set up in four study vineyards to document species causing damage, both during the day and at night. Several species of wildlife were documented consuming grapes. Although turkeys were among the most reported causes of damage by vineyard owners, information collected in these investigations suggests that turkeys are blamed for more damage than they actually cause. While in the vineyards, turkeys were most commonly observed feeding from the ground, on green vegetation and insects. Feeding from the ground is more natural behavior for turkeys than to feed from vines overhead. However, some turkeys were observed doing the latter, and such behavior may be learned.

In these investigations, several other species were also documented consuming grapes, including deer, raccoons, ground squirrels, song birds, and jays. Turkey damage was higher in the vineyards juxtaposed nearest turkey habitat, but damage from these other species was more widespread. Turkeys were documented drinking water from irrigation puddles, consuming green vegetation and probably insects from the ground, consuming grapes that had been discarded on the ground during thinning, and consuming grapes from vines. These preliminary findings regarding turkey depredation are consistent with reports in other states to other crops (Tefft et al. 2001), whereby turkeys are blamed for damage largely because they are the most visible animals. Nevertheless, turkeys are known to cause depredations to wine grapes and the following are the Department's management recommendations to address this issue.

Goal: Minimize agricultural depredation by turkeys while minimizing unnecessary impacts to turkey populations.

Strategies:

a. Information collection and dissemination

The Department will gather information to better understand the types of agricultural depredations caused by turkeys and other wildlife and how damage may be prevented and/or minimized. The Department will work with local agricultural extension offices and other entities to develop effective communication outlets.

b. Provide mechanisms for landowners to reduce ongoing impacts from turkeys

Overall, turkeys probably cause minimal damage to agricultural crops, but they may cause significant damage in specific situations. Outside existing hunting seasons, landowners currently have limited mechanisms to offset impacts from turkeys. This recommendation is intended to address ongoing depredations as they are occurring. The next recommendation addresses more long term population issues.

Generally, landowners can not physically prevent turkeys from entering their vineyards with fences. Methods of hazing turkeys on a large scale also tend not to be very effective. Trapping and relocation is not a feasible method of reducing depredation as it is occurring in vineyards, although it is a potential method of reducing overall populations in the area (see below). Grapes are ripe for harvest for a short period from late-August through early October, depending on variety. Trapping efforts can take considerable time; therefore, trapping would not be an effective method of dealing with depredating birds since most of the damage would have already occurred. Furthermore, it is commonly too warm to translocate turkeys humanely during that time of year (see Population Monitoring).

Fish and Game Code Section 4181 allows landowners to apply to the Department to obtain a permit to kill specific game mammals that are causing property damage, most commonly applied to crops. The Department recommends a change in Fish and Game Code to also allow depredation permits to be obtained for turkeys. However, in considering such a change, the Department recommends that discretion be given to limit such permits for turkeys relative to the amount of damage they are actually causing, and that landowners be required to take reasonable actions to prevent such damage from occurring.

c. Population control in areas of chronic depredation problems

Turkey population trends have grown dramatically in recent years particularly in some of the largest grape producing areas of the state, including Napa, Sonoma, and Mendocino counties. Depredation permits would provide immediate relief for ongoing problems. However, longer-term population control may be needed in areas where turkeys are causing chronic depredation problems. The Department will encourage hunting as the first line of reducing unwanted turkey populations, but much of these lands are privately owned with limited hunting opportunities; and hunting is unlikely to affect

populations on a broader scale in these areas. Trapping and relocation as described above may be an option to manage these populations. Because of the limited success over a broad scale of relocation programs to resolve these issues, reducing populations through trapping and relocation is considered experimental at this time. The Department will give preference for this method of population control to areas where these problems are most severe and there are no other feasible methods to reduce the problems. Monitoring of all translocation programs will be conducted to determine efficacy and help guide future management objectives (see Population Monitoring).

4.1.3: Conflicts between turkeys and public land management policies

State and national parks are mandated by law and policy to manage their lands, in part, for native flora and fauna. Some state and national park personnel have expressed concern about growing turkey populations on park lands because they are not indigenous animals. More recently, similar concerns have been expressed by municipalities and other private lands. Wild turkeys have not been released in any parks, although they have moved into some parks as the result of stocking programs. The Department has conducted some removal of turkeys from Cuyamaca Rancho State Park in San Diego County since 1995. This effort has resulted in some success in reducing the number of turkeys on the park.

Goal: Minimize unwanted turkey populations on public lands where they are a conflict with the stated management goals of those lands.

Strategies:

a. Identify public lands where turkeys are a conflict

The Department will work with public land management agencies to identify where turkeys exist on their lands and where they are considered a conflict with land management goals. The agencies will collectively prioritize areas most in need of population management, based on the size and trend of the turkey population.

b. Relocate turkeys from selected public lands

The Department will work with public land management agencies to attempt to remove turkeys from areas identified above, emphasizing areas where population trends are increasing and turkeys primarily occupy lands where they are not desired. Turkeys will be relocated to areas where they will provide the most benefit to the public. Turkey population control should be focused in areas where population trends are increasing and reasonable success is expected, recognizing that other turkeys may recolonize from surrounding properties. The Department will monitor the success of population control programs to set realistic population management objectives on these public lands.

4.1.4: Potential conflicts between turkeys and native species

Opposition to the Department's long-standing program of releasing turkeys to expand their range and provide new hunting opportunities has been raised by both government agencies and the public. Because turkeys are not considered native to the state, concerns about the potential impacts of wild turkeys to sensitive native plants and animals have been expressed since the early 1990's. Wild turkeys are opportunistic omnivores and there is concern they may utilize sensitive resources to the point of decline. To date, there have not been any demonstrated negative effects of wild turkeys on any sensitive organisms in or outside their native range, including California. However, because such effects may be subtle and difficult to detect in the short term, long term monitoring of turkeys in California is required to better understand potential conflicts.

Goal: Gather information to better understand potential conflicts between turkeys and native species and manage turkey populations to minimize such potential impacts.

Strategies:

a. Improve understanding of turkey ecology in California

The Department will gather pertinent information regarding turkey ecology from ongoing studies within California and other relevant areas to better understand potential interactions between turkeys and native species. The Department will encourage monitoring and research projects in California in conjunction with interested universities, government agencies, and non-profit organizations, to improve its understanding of turkey ecology in California.

b. Manage turkey populations to best avoid potential conflicts with native species

Information gathered regarding turkey ecology will be used to shape turkey management to best avoid conflicts between turkeys and native species. Management of turkey populations will also be based around land management goals, such that turkeys are emphasized in areas open to hunting. Turkeys will not be emphasized in areas not open to hunting, where native species are a management goal, and where they, may conflict with land management policies, such as parks described above.

c. Range expansion

Considerable public opposition to the release of turkeys by the Department to expand their range on higher elevation public lands has developed in recent years. These concerns have focused primarily on potential impacts to the environment, but more recent concerns about nuisance issues have also been expressed. However, the hunting segment of the public wants turkey releases to provide additional hunting opportunities, particularly on public lands.

Turkeys have been released in virtually all suitable parts of the state over the years, with emphasis on public lands. Public desires to release more turkeys on public lands to improve hunting opportunity may be more a perception than realized benefit. Because much of the best turkey habitat in the state is privately owned, turkeys will likely always occupy private lands disproportionately to public lands. Because of concerns regarding potentially negative effects of turkeys, the Department will not release turkeys to expand turkey range, unless significant information demonstrating negligible or beneficial ecological effects is documented. However, turkeys are continuing to expand their range on their own, and the Department will not actively prevent turkeys from becoming established in new areas of the state unless conflicts as described above are documented.

4.2: Educational and Recreational Opportunities

4.2.1: Recreational opportunities on public lands

Wild turkeys offer highly valued educational and recreational opportunities for the public. Although a non-native bird, turkeys are a part of the history of the state and they are a highly social and visible animal, thereby providing valued viewing opportunities and insights into animal behavior for the public. This section focuses on improving hunting and viewing opportunities for turkeys on public lands. Much of the following two sections will focus on hunting because access to property for hunting is considerably more restrictive than viewing. However, the Department strongly encourages both consumptive (hunting) and non-consumptive (viewing) educational and recreational opportunities for wild turkeys. Use of the term recreational opportunities should be considered to include the inherent educational benefits of those activities.

Turkey hunting is a growing hunting sport in California. Recent surveys conducted by the Department suggest that at least 50% of the people that purchase a hunting license have interest in hunting turkeys, whereas only about 10% of license holders actually report hunting turkeys. The primary reason that up to 40% of interested license holders do not report hunting turkeys is lack of access to or adequate knowledge of locations to hunt them. Most of these prospective turkey hunters do not have access to private lands and must therefore hunt public lands. Although private lands generally offer some of the best hunting opportunities in the state, some public lands also offer good turkey hunting opportunities. This section focuses on improving hunting and viewing opportunities for turkeys on public lands.

Goal 1: Improve public knowledge of recreational opportunities on public lands.

Strategies:

a. Identify recreational opportunities, with emphasis on public lands

Turkey recreational opportunities exist on various public lands statewide. The Department will work with state, federal, and local governments to identify those opportunities.

b. Develop communication outlets to inform the public about recreational opportunities.

The Department will develop various communication outlets to inform the public of recreational opportunities for turkeys. The range map printed in this document will be incorporated into informational outlets. The Department will also print informative articles in publications such as *Tracks*, the Department's website, seminars that also include instruction on hunting, press releases and interviews, meetings of conservation organizations like the National Wild Turkey Federation, and day to day public phone calls and emails.

The Department will also inform the public of unique viewing opportunities in areas where hunting is not permitted, but viewing is allowed. Beyond traditional viewing experiences, a growing segment of the public is also interested in calling turkeys in the spring for photographic purposes, combining many of the facets of hunting and viewing.

Goal 2: Maximize educational and recreational opportunities on appropriate Department lands

Fish and Game Commission policy states that, "The Department shall continue the process of reviewing current upland game management opportunities on lands under its control. The management of the Department's lands should be an example and a model for what can be done to maximize habitat development opportunities and upland game populations. Where and when feasible, habitat on Department-controlled lands shall be managed for upland game species to maximize upland game hunting opportunities. This shall include the use of "put and take hunting programs" where feasible, as well as the prudent use of naturally produced birds."

Strategies:

a. Identify lands under the Department's control for turkey management and public use opportunities

The Department will continuously identify and evaluate lands under its control for turkey recreational opportunities. Department Wildlife Areas that contain turkey populations will be considered prime Department lands for turkey management and public use opportunities. Some Department Ecological Reserves contain turkey populations. These areas are established for the protection of rare, threatened, and endangered species. In cases where hunting is not a conflict with the primary goals of the

Ecological Reserve, hunting will also be encouraged. Wildlife viewing is always an option on Ecological Reserves.

b. Acquire lands for turkey recreational opportunities

The Department will encourage the Wildlife Conservation Board to purchase lands containing turkey populations to increase public recreational opportunities.

c. Manage habitats to maximize turkey populations on appropriate Department lands

The Department will identify, prioritize, and conduct habitat improvement projects to best benefit turkey populations on appropriate Department lands as identified above, provided such management does not conflict with other stated goals of the property.

d. Translocate turkeys to appropriate Department lands.

The Department will release turkeys trapped in residential areas, agricultural areas, and parks, on appropriate Department lands as discussed previously. The primary purpose of this program is to resolve conflicts, not to stock lands for the purpose of turkey range expansion. Therefore, turkeys will only be released on Wildlife Areas that already contain established turkey populations. The Department will monitor the success of this program through band returns and selected radio-telemetry projects.

Goal 3: Develop recreational opportunities on other public lands

The Department has worked closely with the USFS in developing turkey recreational opportunities on National Forest lands for many years. Turkeys also occupy various other public lands, such as those administered by the BLM, Bureau of Reclamation, DPR, and local county and city agencies. In some cases, barriers exist that may prevent turkey hunting, such as access to public lands or restrictions against hunting.

a. Work with other agencies to identify turkey recreational opportunities on their lands

The Department will work with public land management agencies to identify turkey recreational opportunities on their lands and encourage hunting on public lands not currently open to hunting.

b. Improve access to "landlocked" public lands

In some cases, public lands open to hunting are not accessible to the public because the only available access to them is through private lands that are closed. These "landlocked" public lands are particularly a problem on many small BLM and some USFS parcels that have good turkey populations. The Department will work with public land management agencies to identify these areas and improve public access. The

Department will also encourage the Wildlife Conservation Board and other entities to purchase easements or ownership of rights of way when necessary.

c. Identify unique non-consumptive wild turkey recreational opportunities

Wild turkeys are a popular species for wildlife viewing, especially in the springtime when they are displaying. In some cases people may not feel comfortable watching them where hunting is taking place, so the Department will help identify areas where hunting is not allowed, but viewing is an option.

4.2.2: Recreational opportunities on private lands

Private lands offer some of the best turkey recreational opportunities in the state. Although private lands are usually not open to public hunting, many people do have access to private lands for hunting. Private lands often have differing management issues than public lands. Furthermore, private lands often contain healthy turkey populations that are not hunted for various reasons. Private lands come in various forms with differing land management goals, such as those owned by private businesses versus individuals, or lands owned by conservation organizations and those set aside as conservation easements.

Goal: Develop turkey hunting opportunities on private lands

a. Encourage recreational opportunities for public

The Department will work with private landowners to encourage public access to private lands for hunting and other recreational activities. The Department's Game Bird Heritage Program has conducted special hunts for individuals, juniors, and families in areas of private lands where hunting is not open to the public. The Department will seek to expand these types of programs when possible. As previously discussed, when the Department receives complaints about damage by turkeys, it will also encourage hunting as the primary method of population control in these areas.

b. Private Lands Management Program

The Department's Private Lands Management (PLM) Program is a program that benefits wildlife habitat by providing incentives for private landowners to manage their lands for wildlife. Landowners often receive extended hunting seasons and tags for particular wildlife as identified in a management plan for those lands, which they may in turn use to generate revenue. Although these programs are aimed at game species, conservation of habitat for those species also provides habitat for non-game species. Turkey management opportunities on private lands are abundant; however, few lands are currently enrolled in the PLM program where turkeys are included. Although these lands are not typically open to public hunting, they offer high quality experiences for individuals who do have access to them. The Department will encourage management

opportunities on private lands for turkeys through this and other similar types of programs.

c. Develop hunting opportunities in areas not traditionally open to hunting

Many municipal areas of the state are not open to shooting because of firearms restrictions. At the Department's request, the Commission allowed the use of air rifles as a legal method of take for upland game birds in 2000, partly to open up some of these areas for turkey hunting, although air rifles may also be restricted in some. Archery may be another option to increase hunting opportunity in these areas. The Department will continue to seek potential options to address this issue.

4.3: Population Monitoring and Harvest Management

4.3.1: Population monitoring

Good wild turkey management starts with a basic understanding of population dynamics, including distribution, abundance, and movements over time. The range map (Fig. 3.5) is a good start in understanding better the distribution of turkeys in the state. The abundance or size of a turkey population is more difficult to estimate, and a good estimate usually requires a large investment of time and money. Population models are utilized by managers to predict changes in populations, often as the result of management actions. However, such models are only as reliable as the information used to set parameters. California is a large state, with local populations of turkeys potentially undergoing different population dynamics. Each of these populations should be managed based on a better understanding of local population dynamics.

Strategies:

a) Establish turkey management units

The Department will establish Turkey Management Units (TMUs), based on a combination of biological, ecological, physiographic, and socio-political factors. These units will serve as areas to collect information about the turkey populations, set regulations based on that information, and collect information about harvest (see below). They need to be based on subpopulations of turkeys occupying larger ecosystems combined with socio-political factors discussed earlier. These areas should not be any more complicated than they need to be considering the above factors, so that regulations can be based on areas that are easily discernable by the public. For example, boundaries of hunting zones regulations traditionally include counties or groups of counties in California.

Preliminarily, there are five major areas within the state that contain unique sets of biological and socio-political factors for potential TMU's. The Central Coast Ranges are areas of dense turkey populations, primarily privately-owned, where nuisance and depredation issues are highest. The Sierra Nevada foothills are similar to the Central

Coast, with some higher elevation populations on more public lands and fewer conflicts with people. The North Coast inland through the greater area around Lake Shasta have smaller turkey populations, with a larger amount of public lands and little to no conflicts with people. North-central and Northeastern California contain struggling populations of primarily Merriam's turkeys and a large amount of public lands, where they are highly desired by the public at large. Southern California, from San Bernardino County south to San Diego County is drier habitat with smaller turkey populations on a combination of public and private lands where conflicts with people are minimal. Establishment of TMU's will require some further investigations and information collection.

b. Periodically update statewide range map and population estimates

Because turkey populations are dynamic, the Department will periodically incorporate monitoring information into updating the range map presented earlier. The Department will also gather information within local populations to better understand their dynamics. Information needs should be prioritized in each area, and techniques that will provide the most reliable information should be used to collect data. The Department will consider using information collected from other sources, such as the Breeding Bird Survey and hunters, for efficiency.

c. Monitor translocations

The Department will approach all translocations of turkeys with caution considering many of the factors discussed in this document. Translocations will be conducted on an experimental basis, primarily as a last resort in an attempt to resolve nuisance-related issues. The Department will monitor the effectiveness of these efforts in both the removal and release areas. The Department will follow-up with landowners to evaluate the effectiveness of removal. Leg bands will be put on all translocated birds, and the Department will conduct selected radio-telemetry investigations to more closely track the movements of relocated birds. Information collected from these investigations will be used to evaluate translocation as a management option in the future.

d) Monitor population genetics

As discussed earlier in this document, California's wild turkey population is the result of numerous releases of various stock over the years. Over time, the Department will seek to partner with appropriate Universities and organizations to collect information to better understand the populations genetics of turkeys statewide.

e. Animal care and disease monitoring

The Department will typically translocate turkeys between November and March, when birds are older, may be more easily caught, and the weather is cooler. Birds will be held in captivity for no more than 4 days and all will be tested for disease prior to release according to the Department's disease testing protocol for turkey relocations (Gonzales 1997).

The Department has a long history of monitoring turkey diseases. Nearly all turkeys translocated in California have been tested for diseases prior to release, including avian influenza, Newcastle's disease, avian hemorrhagic enteritis, *Salmonella typhimurium*, *M. synoviae*, and *M. meleagridis*. Prevalence of antibodies to these diseases has been very low in California (0-4.2%, n=715; Charlton 1999). All birds testing positive for antibodies to any of these diseases have been destroyed. A recent outbreak of Exotic Newcastle's Disease (END) in other domestic birds has resulted in a quarantine for all birds in southern California. Although wild turkeys are not known to have the disease, END is a highly virulent and deadly disease in all birds. The Department will not move any turkeys suspected to contain any diseases as judged by the Department's veterinarians.

4.3.2. Harvest Management

Hunting regulations are currently consistent statewide, with the exception of San Diego County which is closed to fall turkey hunting. The turkey population has continued to grow in California, suggesting that these regulations have been sustainable over time. However, managing harvest from a statewide perspective may not allow for adaptability of regulations to unique conditions in different parts of the state. Wild turkey harvest is driven by the biology of the turkey populations and socio-political factors, both of which are taken into account when setting regulations.

The growth of a turkey population is a function of its size, survival, and productivity. Hunting can influence each of these parameters. Regulations are typically set to maximize hunting opportunity while minimizing potential impacts to any of these variables, such that the population maintains a positive growth rate. As discussed earlier, a fundamental principle of turkey harvest management is that spring gobbler harvest is more sustainable than fall either-sex harvest. Over-harvest in the fall affects survival of adult hens, which thereby also affects potential reproduction. Therefore, fall hunting has the largest effect on the growth rate of turkey populations.

As discussed throughout this document, turkey hunting pressure can be quite different between public and private lands. Hunting pressure is highest on public lands, where turkey populations are often relatively low in abundance and hunter numbers are not closely controlled. Hunting pressure is often considerably lower on private lands where turkey populations are moderate to high in abundance. Harvest on these private lands is often controlled by the landowner, by limiting access and bag limits. Harvest in some areas of the state that contain abundant turkey populations is also highly limited by restricting hunting entirely on private lands, restricting hunting on designated public lands, and/or prohibiting the use of certain weapons in municipal areas. Furthermore, many of the areas where turkey nuisance complaints are highest in the state receive little hunting pressure due to their proximity to residential areas.

Although socio-political factors have the greatest effects on harvest, it is generally not practical to set regulations for public versus private lands. The problem is primarily a

matter of scale, in that turkey populations cover a broad area where they may occupy both types of lands. It may be practical to base regulations on a combination of variables that also consider socio-political issues, such as the relative amount of private versus public lands and land use activities in particular areas of the state. Local land-use regulations may further help to regulate harvest within these broader areas, such as private lands enrolled in the PLM program with extended hunting seasons, or some public Wildlife Areas where access is controlled through permits during certain portions of the season.

Goal: Recommend regulations to the Commission that maximize sustainable hunting opportunities statewide, considering both biological and socio-political issues.

Strategies:

a. Use an adaptive harvest approach

Development of hunting regulations should come from an adaptive harvest process, whereby harvest objectives are established, monitored, and adjusted when objectives are not met, based on the following procedures as described by Healy and Powell (1999):

1) Obtain population estimates by TMU

Population estimates are critical in regulating harvest, but they can be difficult to obtain reliably because turkeys tend to be clumped in distribution across the landscape. Population estimates tend to be expressed in density (i.e. the number of birds per square mile). The choice of a particular technique for estimating population density should be set for each area, based on unique issues for that area, independent of techniques used to gather harvest data (see below). The quality of these data can have a considerable effect on setting and evaluating harvest management goals.

2) Monitor populations and harvest trends

Long-term harvest goals should be set for each TMU, based on information regarding population density estimates, past harvest data, and program goals. The standard for harvest goals should be based on trends in spring gobbler kill. Remedial actions should then be specified when these goals are not met. Short-term responses to significantly changing trends in spring harvest should focus on changes in fall harvest. If such fall season changes are not effective over time, changes in spring harvest should also be considered.

3) Measure harvest

Turkey harvest has been estimated by a mail in survey of approximately 4% of hunting license buyers since the first hunting season in 1968, although spring and fall were not split until 1991. Harvest is depicted by county, and general trends appear to be

reliable. Specific surveys by TMU should also be considered for comparative purposes to current techniques.

b. Recommend regulations to the Commission that maximize sustainable spring gobbler harvest with limited either-sex fall harvest.

The spirit of hunting regulations should be simple. An overall framework for turkey regulations should be set statewide, similar to existing regulations. Although information collection and harvest management are based on TMU's, deviation from that framework should only occur if harvest management goals require a change. Healy and Powell (1999) outline basic harvest strategies for wild turkeys, based on years of harvest management from 13 states in the northeast. The strategy that most suits the needs of California is to maximize sustainable spring gobbler harvest with limited either-sex fall harvest. Managers have the following three basic variables that can be used in setting regulations to achieve harvest goals:

1) Season timing and length

Season timing and length are most important for the spring, considering that turkeys are being hunted during their breeding season. The goal is to remove a portion of the male segment of the population when it has the least potential impact to breeding, yet comes at a time when hunters have a good chance to hear and harvest gobblers. In California, only bearded turkeys may be taken during spring. A small percentage of females will grow beards as well, and they are legal to take in spring based on current regulations. Some states require that only males be harvested, but because turkey hunting is a relatively new sport in California, bearded turkeys provide an easy discernable characteristic for turkey hunters. A small amount of spring hen harvest may be sustainable, but should be measured to better evaluate potential impacts to local populations.

Spring hunting seasons set early in the breeding season provide good hunter opportunity, but have the greatest risk of overharvest of both males and females (legal and illegal harvest), the latter of which will become less vulnerable as they begin nesting. Season length will have the greatest impact on the amount of male harvest, which become more vulnerable later in the season when the majority of hens are nesting. Hunting hours are currently set from one-half hour before sunrise to 4 PM, to reduce potential take of females that leave their nests in the afternoon to feed, and to allow gobblers to find roosts undisturbed. The fall season tends to be set based on tradition, particularly surrounding Thanksgiving. Fall harvest is better controlled through season limits and hunter numbers discussed below.

2) Bag, possession, and season limits.

Limits in the number of turkeys that may be taken during the season provides more control over harvest than timing and length, particularly during the fall. However, such control is obviously limited by the number of hunters in an area, as discussed below.

Currently, hunters can only harvest one bird of either-sex in the fall statewide. Fall season limits should especially be based on harvest goals as previously discussed. Male harvest in the fall primarily affects the quality of hunt in the spring, by removing jakes and gobblers from the population.

3) Control of hunter numbers

Controlling the number of hunters that can hunt a particular area is the strongest means of controlling harvest. Many states use a limited number of permits to control harvest of turkey populations. Hunter numbers are not controlled in California by regulations; anyone can hunt turkeys with a hunting license and upland game bird stamp. Hunter numbers are essentially controlled on private lands by the landowners by limiting access to their property. Public lands open to hunting are available to anyone, with the exception of some Department-owned Wildlife Areas and other lands where permits are required for part or all of the season. In these cases, hunter access is limited primarily for quality of experience, not necessarily based on harvest goals.

c. Periodically conduct surveys to better understand public desires for turkey management

Regulations can be set in various combinations to achieve the same harvest goals. Although the Department recommends maximizing spring gobbler harvest and limited either-sex fall harvest, other options are available depending on public desires. One common issue is the balance between maximizing hunting opportunity for the public with quality of experience, which is a common concern on public lands. Therefore, the Department should conduct periodic surveys of the hunting public to better understand their desires and adjust management and recommendations accordingly.

4.4. Conservation Partnerships

Effective turkey management needs to be a partnership between various regulatory and land-management agencies and non-government organizations (NGO's). The Department is the primary agency responsible for the management of turkeys in the state, but it manages a relatively small amount of land. The Department has worked closely with the USFS for many years in establishing mutual turkey management goals on USFS lands, which represent the largest amount of public lands in the state. The Department has also worked closely with the National Wild Turkey Federation over the past 15 years, which has developed a large state chapter. Recent issues as discussed throughout this plan and budget limitations of the Department dictate the need to expand these partnerships for more effective turkey management statewide.

Goal: Develop effective turkey management partnerships with other agencies and NGO's.

Strategies:

a. Work with appropriate federal, state, and local government agencies to develop turkey management plans for their lands

Management issues for turkeys on public lands vary from desires to improve hunting opportunity on huntable public lands to controlling turkey populations on certain national and state park lands. Furthermore, management opportunities on lands administered by other agencies, such as BLM, Bureau of Reclamation, and many local county and city lands, may not be fully understood. Each of these agencies are driven by their own regulations and policies. As discussed throughout this document, the future of turkey management should be aligned closely with land management goals. The Department will encourage development of management plans with these agencies, particularly as issues arise, that best meet the goals of the Department's overall approach to turkey management as outlined in this document.

b. Work with NGO's to develop mutual management and educational programs in California

The Department has had a long-term partnership with the National Wild Turkey Federation, which is the nation's largest turkey-based NGO. The NWTF is a critical link in turkey management by providing expertise and contributing funds to the Department and other agencies for turkey management and providing a basis for ethics of conservation and sportsmanship to the public. The NWTF also has various programs with agencies and the private sector for development of habitat and hunting opportunities. The Department will continue to work with the NWTF and other NGO's to develop mutual programs consistent with the Department's overall approach to turkey management as outlined in this plan.

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